Do *Nucella lapillus* lay their egg capsules in locations that increase offspring survival?

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Dogwhelks, *Nucella lapillus*, laying egg capsules in an intertidal crevice

(1) INTRODUCTION: The eggs and larvae of intertidal organisms are highly vulnerable to mortality by predation and environmental stresses. These factors can especially impact life history stages, such as the egg capsules of the intertidal dogwhelk, *Nucella lapillus*, which are attached in one place to the rocks. The mortality of newly hatched juvenile snails will additionally depend on the availability of barnacles for food. The impact of each of these factors on mortality will depend on how microhabitat use ameliorates the negative effects of predation and desiccation stresses and enhances the density of prey. In the table below, we qualitatively predict the relative magnitude of each of these factors in different microhabitats

Microhabitat	Predation pressure	Desiccation Stress	Food (barnacle) Density
IDEAL	LOW	LOW	HIGH
Vertical rock surfaces	LOW	HIGH	HIGH
Crevices	HIGH	LOW	HIGH
Tidepools	HIGH	LOW	LOW
Under rocks	HIGH	LOW	LOW
Horizontal rock surfaces	HIGH	HIGH	LOW

(2) Hypotheses

(i) Egg capsules are laid in locations that are non-random with respect to the:

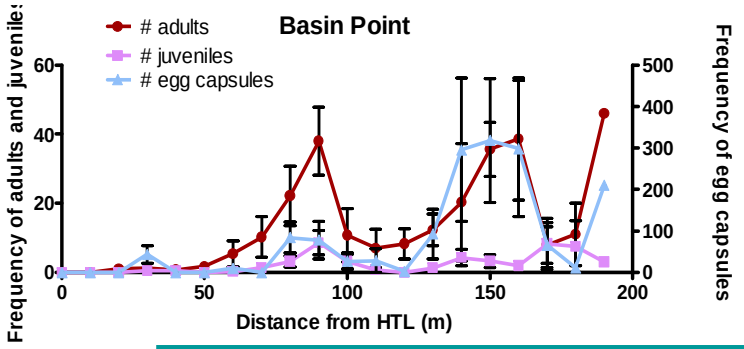
(a) Biological environment: Predator, adult *Nucella* and food (barnacle) density

(b) Physical environment: Tidal height and Microhabitat type

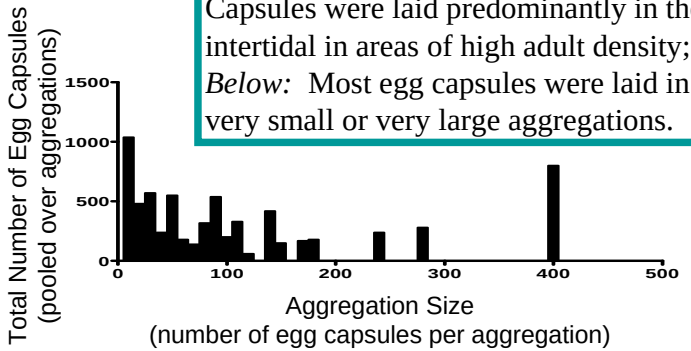
(ii) Survival of *N. lapillus* offspring is greatest in microhabitats with the greatest number of egg capsules

(3) METHODS: Number and mortality of capsules and density of predators, adults and prey were surveyed in each microhabitat every 10 meters from the high tide level (HTL).

Source of mortality was quantified as either desiccation (pink capsule, right photo) or predation (clipped capsule, left photo)



(4) PRELIMINARY RESULTS: (a) *Above:* Capsules were laid predominantly in the lower intertidal in areas of high adult density; (b) *Below:* Most egg capsules were laid in either very small or very large aggregations.



(5) INTERPRETATION: (a) Egg capsules in the middle of large aggregations or in the lower intertidal may be less vulnerable desiccation stress. (b) Capsules in very small or in the middle of very large aggregations may be less vulnerable to predation.

Much data analysis remains, but preliminary indications are:

(i) Egg capsules are laid in non-random locations;

(ii) Survival is higher in these non-random locations then elsewhere;

(iii) Locations may be even more important to juvenile survival.

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